

**CLAIMS**

1. A method for separating a two-phase mixture of two immiscible fluids into a first fluid and a second fluid and simultaneously separating at least one of the first and second fluid in a fraction with high density and a fraction with low density where the fractions are miscible comprising the steps of a separation tray

subjecting the two-phase mixture to a first gravity separation and withdrawing separately the first and a second fluid, and

subjecting at least one of the first and second fluid to a second gravity separation, which is a float separation and separating at least one of the first and second fluid into a light and a heavy fraction by means of a float having a density between the densities of the two fluid fractions.

2. The method of claim 1, wherein the gravity separation is performed by means of the separation tray provided with a plurality of first and second chimneys, the fluid with low density enters the first chimneys having holes at top, and the fluid with high density enters the second chimneys having holes adjacent to an upper surface of the separation tray, and

wherein the float separation is performed by means of a float installed in the first and/or the second chimneys having a density between the densities of the two fractions and wherein the light fraction is withdrawn from the chimneys through holes above the float and the heavy fraction is passed through the chimneys.

3. Method in accordance with claim 1, wherein the first fluid and the second fluid is a liquid.

4. Method in accordance with claim 1, wherein the first fluid is a liquid and the second fluid is a gas.

5. An apparatus for use in a method in accordance with anyone of the preceding claims, comprising a tray with at least two plates and with a plurality of first and second chimneys, the first chimneys having sloping holes at top, wherein the light fluid enters the chimney, the second chimneys having holes at an upper surface of an upper plate and wherein the heavy fluid enters the chimney, at least one of the two chimneys having a contraction installed and a float above the contraction inserted, the float has a density between the densities of two liquid fractions to be separated, the chimney has a liquid outlet above the float at a lower surface of the upper plate the float is adapted to rest on and seal the contraction when the fluid in the chimney has a density lower than the density of the float, and the float is adapted to be lifted when the fluid has a density higher than the density of the float.

6. Apparatus of claim 5, wherein top cover of the density separating chimneys is removable and the float can be replaced with another float having another density.